Aaron Bauer

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Education

University of Washington, Ph.D. Computer Science 2019
Thesis: Understanding Problem Solving and Collaboration in Open-Ended Environments
Committee: Zoran Popović (Chair), Dan Weld, Steve Tanimoto, Andy Ko

University of Washington, M.Sc. Computer Science 2013
Qualifying Project: Automated Redesign of Local Playspace Properties
Advisor: Zoran Popović

Williams College, B.A. Computer Science (magna cum laude) 2011

Teaching

Instructor

CSE 374: Intermediate Programming Concepts & Tools (Undergraduate, University of Washington) Winter 2016

Taught an upper-level non-majors course with 74 students focused on practical skills including the `bash` shell and C programming and advanced concepts such as memory management. Broadened topic list from previous offerings to include assembly programming and concurrency and reworked assignments on shell scripting. Gave three lectures per week, frequently helped students one-on-one, wrote two exams, and coordinated team of three TAs. Course web page available at `https://courses.cs.washington.edu/courses/cse374/16wi/`.

CSE 373: Data Structures & Algorithms (Undergraduate, University of Washington) Winter 2014

Taught an upper-level non-majors course with 132 students covering a variety of classic data structures and algorithms as well as asymptotic analysis, proof by induction, and concurrency. Gave three lectures per week, met with students in office hours, wrote three exams, and managed team of seven TAs. Course web page available at `https://courses.cs.washington.edu/courses/cse373/14wi/`.

Teaching Assistant

CSE 333: Systems Programming (Undergraduate, University of Washington) Fall 2011

Assisted in teaching course focused on programming in C++ taught by Stuart Reges. Led two weekly 30-student sections reviewing and expanding on material from lecture. Graded assignments and exams and supervised grading done by second TA.

CSCI 107: Creating Games (Undergraduate, Williams College) Spring 2011

Assisted in teaching course on the art and science of creating games taught by Morgan McGuire. Prototyped lab activities and helped students during lecture and lab time.

Summer Science Program

At the Summer Science Program (SSP), 36 rising high school seniors spend six weeks learning math, physics, astronomy, and programming and bring that knowledge to bear on an independent astrophysics research project. The program is highly selective with an acceptance rate of about 10 percent. For many participants, SSP is their first programming experience. More information available at `https://summerscience.org`.

Adjunct Instructor for Programming 2014–2018

Taught introductory programming in Python for the past five summers. Each summer, delivered nine hours of lecture over the first 10 days of the program, oversaw programming homework, and worked with students in the computer lab. Iterated on lectures and assignments each year, adding new running examples and in-class activities and restructuring the material to better target the skills students need for their research project.

Programming Curriculum Consultant 2013

Authored a new programming curriculum in collaboration with SSP faculty and administrators. Produced a comprehensive set of materials including lecture notes, homework assignments, grading guidelines, and commentary about scheduling and the rationale behind the design of the materials. Homework included alternate advanced exercises for students with significant previous programming experience. SSP continues to use this curriculum every summer.

Teaching Assistant and Residential Mentor 2011, 2012

Supervised student telescope observing sessions and offered students guidance throughout the program. Graded all programming homework and provided feedback to students. On my own initiative, rewrote and replaced the programming assignments and held tutorials to cover additional concepts I introduced.

Outreach

Seattle Public Library Summer of Learning 2015–2016

Ran eight two-hour sessions of *How to Program Your Dragon* through Seattle Public Library's Summer of Learning program. Targeted primarily at late elementary and middle school students, the sessions exposed participants to fundamental programming and computational thinking concepts through my educational game, Dragon Architect (`dragonarchitect.net`). My role was facilitator rather than instructor, as the game and participants' individual creative goals guided the experience.

University of Washington Engineering Discovery Days 2014–2016

Presented projects from the Center for Game Science to visiting K–12 students and parents as part of three annual Discovery Days events. Duties included explaining the projects, answering questions about the Center and computer science at UW, and pointing parents toward opportunities and materials for computer science education.

Volunteer Tutor

Volunteered through a School of Computer Science & Engineering program to tutor undergraduate majors. Met with groups of one to three students for an hour each week to discuss material from recent lectures and questions about homework assignments. Courses tutored are listed below.

CSE 332 Data Structures and Parallelism	Autumn 2014, Summer 2015, Winter 2017
CSE 311 Foundations Of Computing I	Autumn 2016
CSE 341 Programming Languages	Spring 2016
CSE 331 Software Design And Implementation	Winter 2015
CSE 351 The Hardware/Software Interface	Spring 2015

Research Interests

Problem solving, educational data mining, data science, educational technology, computer science education, educational game design

Research Experience

Research Assistant, University of Washington 2012–present
Mentor: Zoran Popović

Conducted research across a variety of fields as part of the Center for Game Science. Project areas included problem-solving strategies, computer science education, educational technology, and game design.

Summer Research Intern, Enlearn 2017
Mentor: Yun-En Liu

Performed statistical data analysis and built data visualization tools to address research questions about student performance in an intelligent tutoring system.

Research Assistant, Williams College 2008–2011
Mentor: Rónadh Cox

Assisted with a computer simulation research project modeling impacts on the surface of Jupiter's moon Europa.

Summer Research Intern, Lunar and Planetary Institute 2010
Mentor: Tomasz Stepinski

Applied machine-learning algorithms to detect lunar craters from high-resolution elevation data.

Publications

Refereed Conference Papers

[1] **Aaron Bauer** and Zoran Popović. Collaborative Problem Solving in an Open-Ended Scientific Discovery Game. In *Proceedings of the ACM on Human-Computer Interaction, vol. 1, issue CSCW, article no. 22*. 2017. **Best Paper Award**.

[2] **Aaron Bauer**, Jeff Flatten, and Zoran Popović. Analysis of problem-solving behavior in open-ended scientific-discovery game challenges. In *Conference on Educational Data Mining (EDM)*. 2017.

[3] **Aaron Bauer**, Eric Butler, and Zoran Popović. Dragon Architect: Open Design Problems for Guided Learning in a Creative Computational Thinking Sandbox Game. In *Conference on the Foundations of Digital Games (FDG)*. 2017.

[4] **Aaron Bauer**, Seth Cooper, and Zoran Popović. Automatic Redesign of Local Playspace Properties. In *Conference on the Foundations of Digital Games (FDG)*. 2013.

[5] **Aaron Bauer** and Zoran Popović. RRT-based game level analysis, visualization, and visual refinement. In *Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*. 2012.

Journal Papers

[1] Rónadh Cox, **Aaron Bauer**. Impact breaching of Europa's ice: Constraints from numerical modeling. In *Journal of Geophysical Research: Planets*, vol. 120, no. 10, pp. 1708–1719, 2015.

Workshop Papers

[1] **Aaron Bauer**, Eric Butler, and Zoran Popović. Approaches for Teaching Computational Thinking Strategies in an Educational Game: A Position Paper. In *Blocks and Beyond workshop at the IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC)*. 2015.

Technical Reports

[1] **Aaron Bauer**, Eleanor O'Rourke, Kyle Thayer, Eric Butler, Whitaker Brand, and Stuart Reges. Practicum: a scalable online system for faded worked examples in CS1. UW-CSE-18-09-01. Paul G. Allen School of Computer Science & Engineering. University of Washington, Seattle. 2018.

Conference Posters

[1] Rónadh Cox, **Aaron Bauer**. Crust-Breaching Impacts at Europa: Hydrocode Models and Geomorphologic Constraints on Ice Thickness. Poster at the *Geological Society of America Annual Meeting & Exposition (GSA)*. 2011.

[2] **Aaron Bauer**, Rónadh Cox. Hydrocode modeling of impacts at Europa. Poster at the *Lunar and Planetary Science Conference (LPSC)*. 2011.

[3] **Aaron Bauer**,Tomasz F Stepinski. Machine Cataloging of Lunar Craters from Digital Terrain Model. Poster at the *Lunar and Planetary Science Conference (LPSC)*. 2011.

[4] **Aaron Bauer**, Rónadh Cox, Veronica J Bray. Hydrocode modeling of ice-penetrating impacts on Jupiter's moon, Europa. Poster at the *Geological Society of America Annual Meeting & Exposition (GSA)*. 2010.

Service

Reviewing

ACM Technical Symposium on Computer Science Education (SIGCSE), PC member	2017–2018
CHI Conference on Human Factors in Computing Systems, PC member	2017, 2019
Innovation and Technology in Computer Science Education (ITiCSE), PC member	2017
Visual Languages and Human-Centric Computing (VL/HCC), Subreviewer	2016–2018
CHI Conference on Human Factors in Computing Systems Student Games Competition	2013